

AD-A071 890

GIANNOTTI AND BUCK ASSOCIATES INC RIVERDALE MD
MOTION PREDICTIONS FOR THE CVA-59, CVA-66 AND CVAN-68. (U)
JUN 77

F/G 13/10

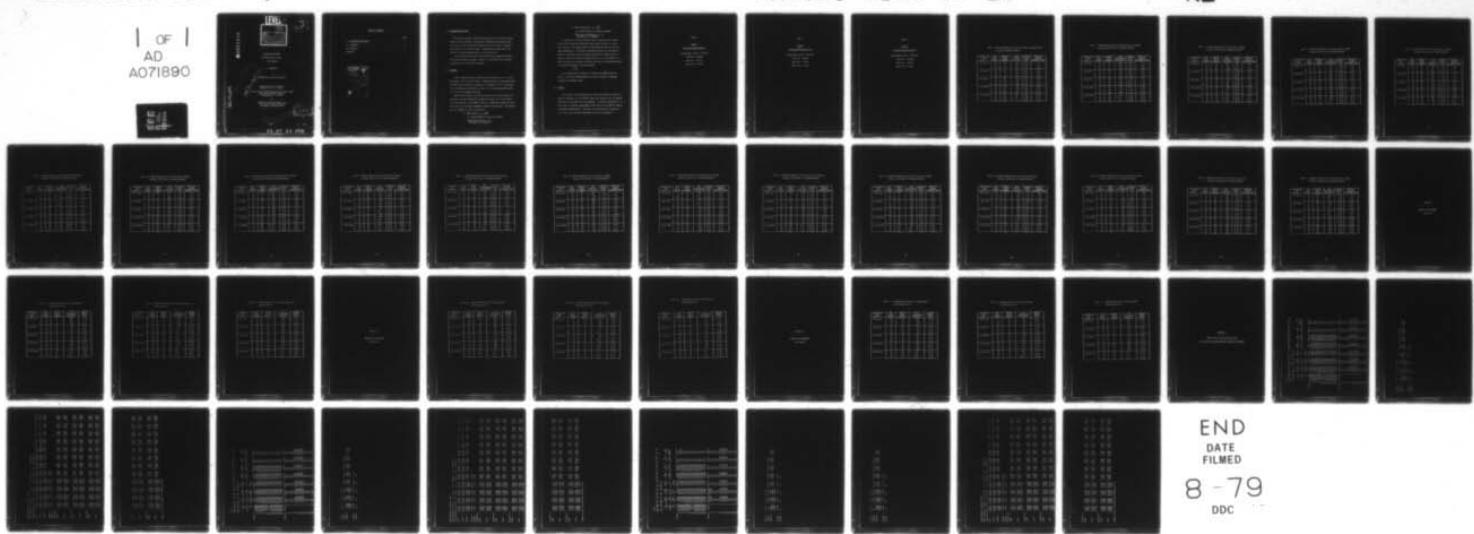
N00600-76-M-1803

UNCLASSIFIED

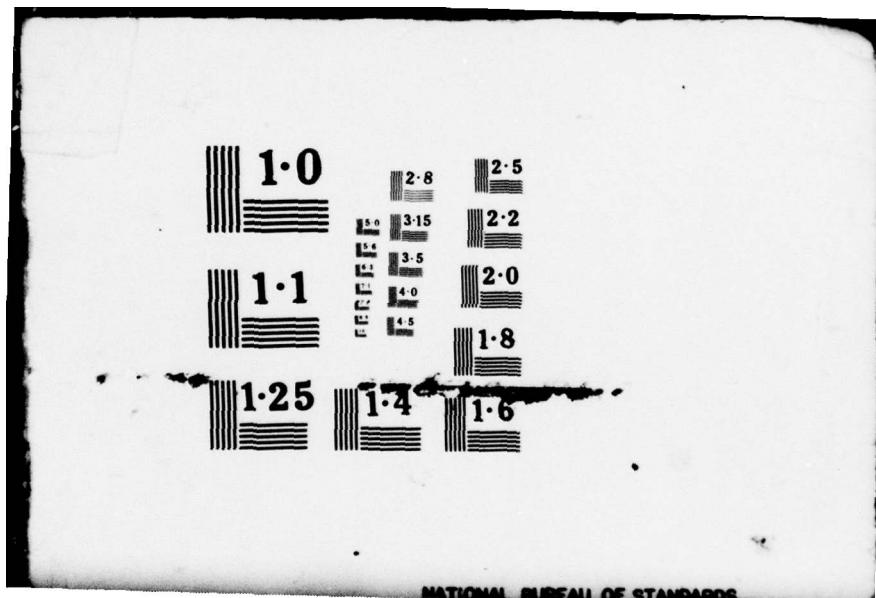
NAVSEC-6136-77-20

NL

| OF |
AD
A071B90



END
DATE
FILED
8-79
DDC



DDC FILE COPY

ADA021890

LEVEL 21

2

6

MOTION PREDICTIONS

FOR THE CVA-59, CVA-66

AND CVAN-68

11 7 JUNE 1977

12 51-P

14

NAVSEC Report No. 6136-77-20

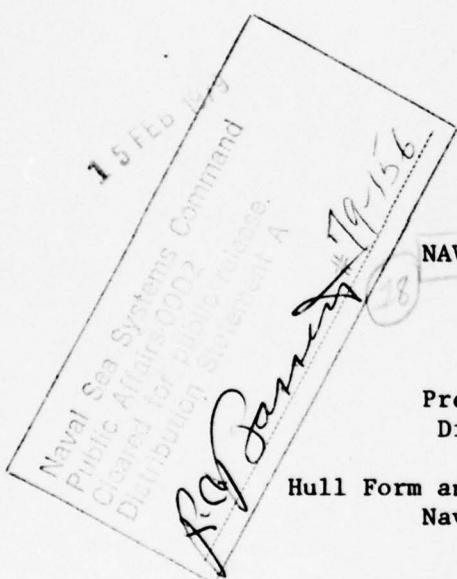


TABLE OF CONTENTS

	PAGE
1.0 <u>BACKGROUND AND SCOPE</u>	1
2.0 <u>APPROACH</u>	1
3.0 <u>RESULTS</u>	2

APPENDICES

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DDC TAB	<input type="checkbox"/>
Unclassified	<input type="checkbox"/>
Justification	<input type="checkbox"/>
By _____	
Distribution/	
Availability Codes	
Avail and/or Special	Special
A	

1.0 BACKGROUND AND SCOPE

This report presents motion predictions for the aircraft carriers CVA-59, CVA-66, CVAN-68. Specifically, NAVSEA 942W requested pitch, roll and yaw rates and period information for Sea States 2 through 6 and speeds of 10, 20 and 25 knots. Furthermore headings were to be selected to yield maximum pitch, roll and yaw rates.

The predictions were made using the MITA five-degree-of-freedom ship motions computer program. Tables 1, 2 and 3 give the principal characteristics of the three carriers.

2.0 APPROACH

Motion predictions were conducted for Sea States 2, 3, 4, 5 and 6 and speeds of 10, 20 and 25 knots. Headings between 0° (following seas) and 180° (head seas) were considered in increments of 15° . The output of the program was then used to arrive at the required maximum values of rate and corresponding periods.

RMS values of pitch, roll and yaw velocities and accelerations in irregular seas were computed by taking the square root of the second and fourth moments of each mode of motion. Significant values for each rate were then calculated assuming a Rayleigh distribution. The following is a summary of these calculations:

$$1) \text{ RMS velocity} = \sigma_v = \sqrt{m_2}$$

m_2 = second moment of response spectrum

Significant velocity = $4 \sigma_v$
(Average of 1/3 highest)

$$2) \text{ RMS acceleration} = \sigma_a = \sqrt{m_4}$$

m_4 = fourth moment of response spectrum

Significant acceleration = $4 \sigma_a$
(Average of 1/3 highest)

In addition to these velocities and accelerations the average period and the period of maximum response were obtained for pitch roll and yaw. The average period is obtained directly from the program computations. The period of maximum response for each mode of motion is obtained from the response spectrum by looking up the frequency at which the specific response (pitch, roll, yaw) peaks out. These frequencies are given in rad/sec and must be converted to period in seconds according to the relationship

$$T = \frac{2\pi}{\omega}$$

For completeness, although not requested by NAVSEA 942W, the pitch, roll and yaw displacements were also recorded for headings yielding the maximum values.

3.0 RESULTS

The results of the predictions of rates and periods are given in Tables 4 through 9 for the CVA-59; Tables 10 through 15 for the CVA-66; and Tables 16 through 21 for the CVAN-68. In addition Appendices A, B and C give the angular displacement predictions for the CVA-59, CVA-66 and CVAN-68 respectively. The input to the MITA motions program for each of the three carriers considered is given in Appendix D.

Table 1

CVA-59

Principal Characteristics

Displacement (tons) - 76740.00

LBP (ft) - 990.00

Beam (ft) - 129.33

Draft (ft) - 36.00

Table 2

CVA-66

Principal Characteristics

Displacement (tons) - 81711.00

LBP (ft) - 990.00

Beam (ft) - 129.33

Draft (ft) - 37.08

Table 3

CVAN-68

Principal Characteristics

Displacement (tons) - 91440.00

LBP (ft) - 1040.00

Beam (ft) - 134.00

Draft (ft) - 36.83

Table 4 CVA-59 Significant Pitch Velocities, Average Periods,
Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	PITCH VELOCITY (DEG/SEC)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	60	.067	7.63	5.27
	20	0	.153	2.70	4.40
	25	45	.075	3.21	4.29
4.90 (SS3)	10	60	.147	8.44	6.35
	20	0	.142	4.06	5.09
	25	90	.110	6.15	6.97
6.50 (SS4)	10	60	.234	9.45	8.80
	20	90	.168	6.76	7.16
	25	90	.156	6.57	7.04
10.20 (SS5)	10	135	.541	8.77	11.00
	20	135	.498	7.90	11.75
	25	135	.453	7.55	11.75
16.90 (SS6)	10	135	1.60	9.89	11.81
	20	135	1.77	8.86	12.50
	25	135	1.77	8.50	12.44

Table 5 CVA-59 Significant Pitch Accelerations, Average Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	PITCH ACCELERATION (DEG/SEC ²)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	90	.080	5.06	5.45
	20	0	.846	2.70	4.40
	25	45	.360	3.21	4.29
4.90 (SS3)	10	90	.142	6.45	6.97
	20	0	.565	4.06	5.09
	25	30	.256	7.58	5.77
6.50 (SS4)	10	90	.198	6.98	7.35
	20	90	.168	6.76	7.16
	25	30	.184	10.78	6.12
10.20 (SS5)	10	135	.407	8.77	11.00
	20	135	.414	7.90	11.75
	25	135	.395	7.55	11.75
16.90 (SS6)	10	135	1.06	9.89	11.81
	20	135	1.30	8.86	12.50
	25	135	1.35	8.50	12.50

Table 6 CVA-59 Significant Roll Velocities, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	ROLL VELOCITY (DEG/SEC)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	60	.045	8.17	6.85
	20	60	.184	11.16	4.40
	25	60	.220	18.81	5.45
4.90 (SS3)	10	60	.155	9.20	6.97
	20	45	.797	21.60	6.97
	25	60	.573	18.70	6.97
6.50 (SS4)	10	60	.236	9.49	7.16
	20	45	1.45	20.66	7.35
	25	60	.867	18.13	7.03
10.20 (SS5)	10	60	.503	10.93	11.00
	20	45	2.57	19.97	7.85
	25	60	1.53	17.69	7.35
16.90 (SS6)	10	60	1.26	14.11	13.51
	20	45	5.32	20.36	13.51
	25	60	4.13	19.14	15.14

Table 7 CVA-59 Significant Roll Accelerations, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	ROLL ACCELERATION (DEG/SEC ²)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	90	.043	4.68	5.10
	20	30	.340	6.08	5.10
	25	45	.373	14.25	5.45
4.90 (SS3)	10	60	.155	9.20	6.97
	20	45	.308	21.60	6.97
	25	60	.279	18.70	6.97
6.50 (SS4)	10	60	.176	9.49	7.16
	20	45	.465	20.66	7.35
	25	60	.327	18.13	7.03
10.20 (SS5)	10	60	.304	10.93	11.00
	20	45	.820	19.97	7.85
	25	60	.550	17.69	7.35
16.90 (SS6)	10	60	.600	14.11	13.51
	20	45	1.65	20.36	13.51
	25	60	1.37	19.14	15.14

Table 8 CVA-59 Significant Yaw Velocities, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	YAW VELOCITY (DEG/SEC)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	90	.056	4.32	5.46
	20	45	.478	4.64	4.17
	25	90	.056	4.31	5.27
4.90 (SS3)	10	90	.092	5.41	6.23
	20	45	.412	6.70	4.70
	25	90	.090	5.35	6.11
6.50 (SS4)	10	90	.116	6.02	7.04
	20	45	.336	9.13	5.03
	25	60	.128	17.27	9.36
10.20 (SS5)	10	60	.296	11.85	10.00
	20	60	.338	14.78	9.68
	25	60	.355	17.11	9.68
16.90 (SS6)	10	60	.681	13.07	11.37
	20	60	.729	15.64	11.12
	25	60	.731	17.55	10.93

Table 9 CVA-59 Significant Yaw Accelerations, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	YAW ACCELERATION (DEG/SEC ²)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	90	.098	4.32	5.46
	20	45	1.71	4.64	4.17
	25	45	.139	32.83	5.27
4.90 (SS3)	10	90	.126	5.41	6.22
	20	45	1.01	6.70	4.70
	25	90	.126	5.35	6.11
6.50 (SS4)	10	90	.141	6.02	7.04
	20	45	.572	9.13	5.03
	25	90	.140	5.96	6.91
10.20 (SS5)	10	90	.162	6.96	8.11
	20	45	.178	17.22	10.49
	25	135	.160	6.67	11.00
16.90 (SS6)	10	60	.337	13.07	11.37
	20	135	.358	8.47	12.50
	25	135	.372	7.95	12.50

Table 10 CVA-66 Significant Pitch Velocities, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	PITCH VELOCITY (DEC/SEC)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	60	.067	7.64	5.27
	20	0	.157	2.72	4.40
	25	45	.081	3.20	4.29
4.90 (SS3)	10	60	.147	8.44	6.97
	20	0	.146	4.08	5.09
	25	90	.103	6.23	6.97
6.50 (SS4)	10	60	.234	9.44	8.80
	20	90	.160	6.86	7.16
	25	90	.147	6.67	7.16
10.20 (SS5)	10	135	.531	8.82	11.00
	20	135	.478	7.95	11.75
	25	135	.432	7.60	12.51
16.90 (SS6)	10	135	1.60	9.92	11.81
	20	135	1.73	8.91	12.50
	25	135	1.73	8.55	12.50

Table 11 CVA-66 Significant Pitch Accelerations, Average Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	PITCH ACCELERATION (DEG/SEC ²)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	90	.073	5.07	5.10
	20	0	.869	2.72	4.40
	25	45	.386	3.20	4.29
4.90 (SS3)	10	90	.133	6.53	6.97
	20	0	.581	4.08	5.09
	25	45	.248	5.81	7.29
6.50 (SS4)	10	90	.188	7.07	7.35
	20	0	.380	5.75	9.36
	25	45	.156	10.59	7.73
10.20 (SS5)	10	135	.396	8.82	11.00
	20	135	.394	7.95	11.75
	25	135	.374	7.60	12.57
16.90 (SS6)	10	135	1.05	9.92	11.81
	20	135	1.27	8.91	12.50
	25	135	1.32	8.55	12.50

Table 12 CVA-66 Significant Roll Velocities, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	ROLL VELOCITY (DEG/SEC)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	60	.042	8.16	6.85
	20	60	.182	10.94	4.28
	25	60	.179	17.02	5.71
4.90 (SS3)	10	60	.163	9.23	6.97
	20	45	.661	23.06	6.97
	25	60	.473	18.13	6.97
6.50 (SS4)	10	60	.263	9.51	7.35
	20	45	1.15	21.42	7.35
	25	60	.738	17.70	7.03
10.20 (SS5)	10	60	.484	10.67	11.00
	20	30	2.04	23.96	8.68
	25	45	1.69	25.83	8.67
16.90 (SS6)	10	60	1.08	13.67	12.88
	20	30	4.47	23.59	9.86
	25	45	4.58	24.11	12.06

Table 13 CVA-66 Significant Roll Accelerations, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	ROLL ACCELERATION (DEG/SEC ²)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	135	.034	4.17	5.45
	20	60	.333	10.94	4.28
	25	45	.381	15.60	5.45
4.90 (SS3)	10	60	.106	9.53	6.97
	20	45	.296	23.06	6.97
	25	45	.275	30.71	8.17
6.50 (SS4)	10	60	.176	9.51	7.35
	20	45	.372	21.42	7.35
	25	60	.288	17.70	7.03
10.20 (SS5)	10	60	.297	10.67	11.00
	20	30	.566	23.96	8.68
	25	60	.468	17.44	7.35
16.90 (SS6)	10	60	.534	13.67	12.88
	20	45	1.23	20.58	15.14
	25	45	1.20	24.11	12.06

Table 14 CVA-66 Significant Yaw Velocities, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	YAW VELOCITY (DEG/SEC)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	90	.054	4.33	5.24
	20	45	.496	4.64	5.95
	25	90	.054	4.20	5.24
4.90 (SS3)	10	90	.088	5.41	6.21
	20	45	.428	6.68	4.89
	25	90	.087	5.35	6.11
6.50 (SS4)	10	90	.112	6.02	6.91
	20	45	.348	9.05	5.03
	25	60	.126	17.21	8.80
10.20 (SS5)	10	60	.292	11.87	10.00
	20	60	.335	14.80	10.00
	25	60	.353	17.13	9.68
16.90 (SS6)	10	60	.679	13.10	11.56
	20	60	.731	15.68	11.12
	25	60	.740	17.59	10.93

Table 15 CVA-66 Significant Yaw Accelerations, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	YAW ACCELERATION (DEG/SEC ²)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	90	.094	4.33	5.24
	20	45	1.78	4.64	5.95
	25	45	.140	32.80	5.24
4.90 (SS3)	10	90	.121	5.41	6.23
	20	45	1.05	6.68	4.89
	25	90	.122	5.35	6.11
6.50 (SS4)	10	90	.135	6.02	6.91
	20	45	.593	9.05	5.03
	25	90	.134	5.95	6.91
10.20 (SS5)	10	60	.136	11.87	10.00
	20	45	.183	17.12	10.56
	25	135	.157	6.69	11.00
16.90 (SS6)	10	60	.335	13.10	11.56
	20	135	.355	8.50	12.44
	25	135	.368	7.98	12.50

Table 16 CVAN-68 Significant Pitch Velocities, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	PITCH VELOCITY (DEG/SEC)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	60	.059	7.63	5.27
	20	0	.147	2.97	4.61
	25	45	.111	3.37	4.52
4.90 (SS3)	10	60	.130	8.43	6.35
	20	0	.139	4.68	5.60
	25	30	.097	7.14	5.87
6.50 (SS4)	10	60	.199	9.39	8.80
	20	90	.154	7.01	7.35
	25	90	.142	6.85	7.35
10.20 (SS5)	10	60	.454	11.33	10.00
	20	135	.377	8.05	11.75
	25	135	.346	7.64	11.75
16.90 (SS6)	10	135	1.33	10.13	12.50
	20	135	1.45	9.09	12.50
	25	135	1.44	8.69	12.88

Table 17 CVAN-68 Significant Pitch Accelerations, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	PITCH ACCELERATION (DEG/SEC ²)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	90	.068	5.09	5.45
	20	0	.794	2.97	4.61
	25	45	.523	3.37	4.52
4.90 (SS3)	10	90	.122	6.57	7.29
	20	0	.538	4.68	5.60
	25	45	.340	5.51	7.29
6.50 (SS4)	10	90	.178	7.15	7.48
	20	0	.356	6.36	6.12
	25	30	.270	10.13	6.28
10.20 (SS5)	10	90	.266	7.73	8.11
	20	135	.306	8.05	11.75
	25	135	.299	7.64	11.75
16.90 (SS6)	10	135	.861	10.13	12.50
	20	135	1.04	9.09	12.50
	25	135	1.08	8.69	12.88

Table 18 CVAN-68 Significant Roll Velocities, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	ROLL VELOCITY (DEG/SEC)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	60	.052	7.70	6.84
	20	30	.255	3.57	4.40
	25	45	.175	5.68	5.45
4.90 (SS3)	10	60	.145	9.09	7.29
	20	45	.381	21.31	7.29
	25	60	.304	17.16	7.29
6.50 (SS4)	10	60	.252	9.48	7.35
	20	45	.776	20.11	8.36
	25	60	.546	17.01	7.35
10.20 (SS5)	10	60	.480	10.76	7.67
	20	45	1.59	19.51	8.48
	25	60	1.15	17.22	7.67
16.90 (SS6)	10	60	1.18	14.17	13.51
	20	45	3.64	20.20	13.51
	25	60	3.34	18.95	14.20

Table 19 CVAN-68 Significant Roll Accelerations, Average Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	ROLL ACCELERATION (DEG/SEC ²)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	60	.044	7.70	6.84
	20	30	1.17	3.57	4.40
	25	45	.733	5.68	5.45
4.90 (SS3)	10	60	.103	9.09	7.29
	20	30	.756	10.71	8.80
	25	45	.520	20.59	8.80
6.50 (SS4)	10	60	.170	9.48	7.35
	20	30	.481	21.39	8.80
	25	45	.366	26.29	8.36
10.20 (SS5)	10	60	.294	10.76	7.67
	20	45	.516	19.51	8.48
	25	60	.423	17.22	7.67
16.90 (SS6)	10	60	.564	14.17	13.51
	20	45	1.14	20.20	13.51
	25	60	1.12	18.95	14.20

Table 20 CVAN-68 Significant Yaw Velocities, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	YAW VELOCITY (DEG/SEC)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	45	.050	10.53	4.52
	20	45	.846	4.58	4.17
	25	60	.106	6.52	4.29
4.90 (SS3)	10	90	.084	5.62	6.35
	20	45	.727	6.39	4.70
	25	60	.094	10.38	8.73
6.50 (SS4)	10	90	.110	6.31	7.35
	20	45	.584	8.46	4.86
	25	60	.106	15.15	9.36
10.20 (SS5)	10	60	.233	12.02	10.49
	20	45	.362	15.40	11.00
	25	60	.281	17.25	9.99
16.90 (SS6)	10	60	.594	13.41	11.81
	20	60	.640	15.94	11.37
	25	60	.642	17.77	11.12

Table 21 CVAN-68 Significant Yaw Accelerations, Average
Periods, and Periods of Maximum Response

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	YAW ACCELERATION (DEG/SEC ²)	AVERAGE PERIOD (SEC)	PERIOD OF MAXIMUM RESPONSE (SEC)
3.02 (SS2)	10	90	.088	4.38	5.45
	20	45	3.03	4.58	4.17
	25	60	.314	6.52	4.29
4.90 (SS3)	10	90	.110	5.62	6.35
	20	45	1.78	6.39	4.69
	25	45	.217	25.00	5.99
6.50 (SS4)	10	90	.126	6.31	7.35
	20	45	1.01	8.46	4.86
	25	45	.149	31.53	6.47
10.20 (SS5)	10	135	.159	8.05	11.00
	20	45	.296	15.40	11.00
	25	135	.155	6.78	11.00
16.90 (SS6)	10	135	.333	9.73	12.06
	20	135	.370	8.57	12.50
	25	135	.377	8.11	12.50

APPENDIX A

ANGULAR DISPLACEMENTS

FOR CVA-59

Table A.1 CVA-59 Significant Pitch Displacement
and Average Period

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	PITCH DISPLACEMENT (DEGREES)	AVERAGE PERIOD (SEC)
3.02 (SS2)	10	60	.082	7.63
	20	0	.066	2.70
	25	60	.048	14.76
4.90 (SS3)	10	60	.198	8.44
	20	60	.150	13.81
	25	60	.123	17.95
6.50 (SS4)	10	60	.352	9.45
	20	60	.280	13.98
	25	60	.249	17.29
10.20 (SS5)	10	60	.942	11.21
	20	60	.804	14.76
	25	60	.749	17.20
16.90 (SS6)	10	135	2.52	9.89
	20	135	2.49	8.86
	25	135	2.39	8.50

Table A.2 CVA-59 Significant Roll Displacement and Average Periods

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	ROLL DISPLACEMENT (DEGREES)	AVERAGE PERIOD (SEC)
3.02 (SS2)	10	60	.059	8.17
	20	45	.696	24.77
	25	60	.658	18.81
4.90 (SS3)	10	60	.226	9.20
	20	45	2.74	21.60
	25	60	1.71	18.70
6.50 (SS4)	10	60	.397	9.49
	20	45	4.75	20.66
	25	60	2.50	18.13
10.20 (SS5)	10	45	.896	12.00
	20	45	8.16	19.97
	25	45	5.07	26.38
16.90 (SS6)	10	60	2.82	14.11
	20	45	17.24	20.36
	25	60	12.58	19.14

Table A.3 CVA-59 Significant Yaw Displacement and Average Period

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	YAW DISPLACEMENT (DEGREES)	AVERAGE PERIOD (SEC)
3.02 (SS2)	10	90	.038	4.32
	20	45	.353	4.64
	25	45	.265	32.83
4.90 (SS3)	10	90	.079	5.41
	20	45	.440	6.70
	25	45	.612	47.96
6.50 (SS4)	10	60	.157	10.33
	20	45	.488	9.13
	25	45	.834	46.94
10.20 (SS5)	10	60	.549	11.85
	20	60	.794	14.78
	25	45	1.33	33.10
16.90 (SS6)	10	60	1.42	13.07
	20	60	1.82	15.64
	25	45	2.64	25.71

Appendix B

ANGULAR DISPLACEMENTS

FOR CVA-66

Table B.1 CVA-66 Significant Pitch Displacement
and Average Period

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	PITCH DISPLACEMENT (DEGREES)	AVERAGE PERIOD (SEC)
3.02 (SS2)	10	60	.082	7.64
	20	0	.068	2.72
	25	60	.053	13.67
4.90 (SS3)	10	60	.198	8.44
	20	60	.154	13.81
	25	60	.129	17.76
6.50 (SS4)	10	60	.351	9.44
	20	60	.282	13.99
	25	60	.250	17.32
10.20 (SS5)	10	60	.940	11.21
	20	60	.800	14.77
	25	60	.744	17.22
16.90 (SS6)	10	135	2.52	9.92
	20	135	2.47	8.91
	25	135	2.36	8.55

Table B.2 CVA-66 Significant Roll Displacement
and Average Period

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	ROLL DISPLACEMENT (DEGREES)	AVERAGE PERIOD (SEC)
3.02 (SS2)	10	60	.055	8.16
	20	45	.778	27.47
	25	60	.489	17.02
4.90 (SS3)	10	60	.225	9.23
	20	45	2.42	23.06
	25	60	1.37	18.13
6.50 (SS4)	10	60	.398	9.51
	20	45	3.93	21.42
	25	45	2.60	28.69
10.20 (SS5)	10	45	.882	11.96
	20	30	8.16	23.96
	25	45	6.93	25.83
16.90 (SS6)	10	60	2.34	13.67
	20	30	16.82	23.59
	25	45	17.56	24.11

Table B.3 CVA-66 Significant Yaw Displacement
and Average Period

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	YAW DISPLACEMENT (DEGREES)	AVERAGE PERIOD (SEC)
3.02 (SS2)	10	90	.037	4.33
	20	45	.366	4.64
	25	45	.269	32.80
4.90 (SS3)	10	90	.076	5.41
	20	45	.455	6.68
	25	45	.621	48.08
6.50 (SS4)	10	60	.154	10.34
	20	45	.501	9.05
	25	45	.842	47.37
10.20 (SS5)	10	60	.552	11.87
	20	60	.789	14.80
	25	45	1.34	33.33
16.90 (SS6)	10	60	1.41	13.10
	20	60	1.83	15.68
	25	45	2.68	25.67

APPENDIX C

ANGULAR DISPLACEMENTS

FOR CVAN-68

Table C.1 CVAN-68 Significant Pitch Displacement
and Average Period

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	PITCH DISPLACEMENT (DEGREES)	AVERAGE PERIOD (SEC)
3.02 (SS2)	10	60	.072	7.63
	20	60	.070	13.52
	25	60	.065	11.21
4.90 (SS3)	10	60	.174	8.43
	20	60	.149	13.86
	25	60	.137	16.72
6.50 (SS4)	10	60	.297	9.39
	20	60	.247	14.05
	25	60	.229	17.44
10.20 (SS5)	10	60	.819	11.33
	20	60	.703	14.86
	25	60	.666	17.33
16.90 (SS6)	10	135	2.15	10.13
	20	135	2.10	9.09
	25	135	1.99	8.69

Table C.2 CVAN-68 Significant Roll Displacement
and Average Period

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	ROLL DISPLACEMENT (DEGREES)	AVERAGE PERIOD (SEC)
3.02 (SS2)	10	45	.078	10.64
	20	60	.334	10.31
	25	60	.217	14.75
4.90 (SS3)	10	60	.211	9.09
	20	45	1.29	21.31
	25	60	.831	17.16
6.50 (SS4)	10	60	.380	9.48
	20	45	2.48	20.11
	25	45	1.70	26.29
10.20 (SS5)	10	60	.822	10.76
	20	45	4.93	19.51
	25	45	4.33	25.74
16.90 (SS6)	10	60	2.66	14.17
	20	45	11.70	20.20
	25	45	10.71	24.28

Table C.3 CVAN-68 Significant Yaw Displacement
and Average Period

SIGNIFICANT WAVE HEIGHT, FT.	SHIP SPEED (KNOTS)	HEADING ANGLE (DEGREES)	YAW DISPLACEMENT (DEGREES)	AVERAGE PERIOD (SEC)
3.02 (SS2)	10	45	.083	10.53
	20	45	.617	4.58
	25	45	.134	11.11
4.90 (SS3)	10	45	.120	10.21
	20	45	.740	6.39
	25	45	.325	25.00
6.50 (SS4)	10	45	.146	10.23
	20	45	.786	8.64
	25	45	.446	31.53
10.20 (SS5)	10	60	.446	12.02
	20	45	.888	15.40
	25	45	.834	28.42
16.90 (SS6)	10	60	1.27	13.41
	20	60	1.62	15.94
	25	45	2.10	24.49

APPENDIX D

INPUT TO MITA SHIP MOTIONS PROGRAM
FOR EACH OF THE THREE AIRCRAFT CARRIERS CONSIDERED

UPR(N)	:	18.8900	32.7000	42.2200
BETA(M)	:	0.0	30.0000	45.0000
OMEGA(L)	:	4.0000	3.0000	2.5000
		1.8000	1.7000	1.6000
		1.1000	1.0000	0.9000
		0.5000	0.2000	0.1000
H13(NW)	:	2.0200	4.8000	5.5000
OMP(NW)	:	0.0	0.0	0.0

MANIPULATIONS IN SUBROUTINE CHECK :

FORM PARAMETERS YIELDING : CR = 0.5024	XFC = -19.2000	WGT = 0.1714081E-09		
STATION PARAMETERS YIELDING : CR = 0.5001	LCA = -18.6096	WGT = 0.1741571E-09		
DX(L) : 49.5000 49.5000 49.5000 49.5000	49.5000 49.5000 49.5000 49.5000	49.5000 49.5000 49.5000 49.5000	49.5000 49.5000	49.5000 49.5000
STA SPA : 24.7500 49.5000 49.5000 49.5000	49.5000 49.5000 49.5000 49.5000	49.5000 49.5000 49.5000 49.5000	49.5000 49.5000	49.5000 49.5000
OMEGA(L) : 0.2259 0.2609 0.2858 0.2948	0.2609 0.3963 0.4125 0.4308	0.2858 0.3963 0.4289 0.4308	0.2948 0.3118 0.3195 0.4510	0.2259 0.2629 0.2946 0.7144
H13 (NW) : 3.0700 4.0070 6.5000 10.2000	4.0070 6.5000 10.2000 16.9000	6.5000 10.2000 16.9000 24.7500	10.2000 16.9000 24.7500 49.5000	3.0700 4.0070 6.5000 49.5000
OMP(NW) : 1.2028 1.0242 0.8928 0.7177	1.0242 0.8928 0.7177 0.5537	0.8928 0.7177 0.5537 0.5000	0.7177 0.5537 0.5000 49.5000	1.2028 1.0242 0.8928 49.5000
SPECTRUM # 1				
SPUMS : 0.7854 0.8513 0.9168 0.9873	0.8513 0.9168 0.9873 1.0478	0.9168 0.9873 1.0478 1.1002	0.9873 1.0478 1.1002 1.1526	0.8513 0.9168 0.9873 1.0478
SPCTM : 0.0011P 0.0171 0.0710 0.1745	0.0171 0.05234 0.06041 0.0710	0.0171 0.05234 0.06041 0.0710	0.0171 0.05234 0.06041 0.1526	0.0011P 0.0171 0.0710 0.1745
SPUMS : 0.6163 1.0498 1.0604 1.0899	1.0498 1.0604 1.0899 1.1203	1.0604 1.0899 1.1203 1.1516	1.0899 1.1203 1.1516 1.1825	0.6163 1.0498 1.0604 1.0899
SPCTM : 0.00061 0.05772 0.2580 0.5017	0.05772 0.2580 0.5017 0.8226	0.2580 0.5017 0.8226 0.9049	0.5017 0.8226 0.9049 0.9257	0.00061 0.05772 0.2580 0.5017
SPUMS : 0.6163 1.0498 1.0604 1.0899	1.0498 1.0604 1.0899 1.1203	1.0604 1.0899 1.1203 1.1516	1.0899 1.1203 1.1516 1.1825	0.6163 1.0498 1.0604 1.0899
SPCTM : 0.00061 0.05772 0.2580 0.5017	0.05772 0.2580 0.5017 0.8226	0.2580 0.5017 0.8226 0.9049	0.5017 0.8226 0.9049 0.9257	0.00061 0.05772 0.2580 0.5017
SPUMS : 0.5257 0.5903 0.6249 0.6696	0.5903 0.6249 0.6696 0.7142	0.6249 0.6696 0.7142 0.7499	0.6696 0.7142 0.7499 0.7856	0.5257 0.5903 0.6249 0.6696
SPCTM : 0.0123 0.1159 0.4824 1.0997	0.1159 0.4824 1.0997 2.1337	0.4824 1.0997 2.1337 2.8719	1.0997 2.1337 2.8719 3.4857	0.0123 0.1159 0.4824 1.0997
SPUMS : 0.9106 0.9285 0.9463 0.9731	0.9285 0.9463 0.9731 0.9990	0.9463 0.9731 0.9990 1.0267	0.9731 0.9990 1.0267 1.0713	0.9106 0.9285 0.9463 0.9731
SPCTM : 4.2210 4.1757 4.1059 3.9648	4.1757 4.1059 3.9648 3.7015	4.1059 3.9648 3.7015 3.5800	4.1059 3.9648 3.7015 3.2524	4.2210 4.1757 4.1059 3.9648
SPUMS : 1.3391 1.4284 1.5177 1.6070	1.4284 1.5177 1.6070 1.6963	1.5177 1.6070 1.6963 1.7855	1.6070 1.6963 1.7855 1.8748	1.3391 1.4284 1.5177 1.6070
SPCTM : 1.5214 1.6555 0.8965 0.6049	1.6555 0.8965 0.6049 0.5426	1.6555 0.8965 0.6049 0.2677	0.8965 0.6049 0.2677 0.1675	1.5214 1.6555 0.8965 0.6049
SPUMS : 0.1607 0.0842 0.0708 0.0708	0.0842 0.0708 0.0708 2.6783	0.0708 0.0708 2.6783 2.6783	0.0708 0.0708 2.6783 2.6783	0.1607 0.0842 0.0708 0.0708
SPECTRUM # 2				
SPUMS : 0.6163 1.0498 1.0604 1.0899	1.0498 1.0604 1.0899 1.1203	1.0604 1.0899 1.1203 1.1516	1.0899 1.1203 1.1516 1.1825	0.6163 1.0498 1.0604 1.0899
SPCTM : 0.00061 0.05772 0.2580 0.5017	0.05772 0.2580 0.5017 0.8226	0.2580 0.5017 0.8226 0.9049	0.5017 0.8226 0.9049 0.9257	0.00061 0.05772 0.2580 0.5017
SPUMS : 0.6163 1.0498 1.0604 1.0899	1.0498 1.0604 1.0899 1.1203	1.0604 1.0899 1.1203 1.1516	1.0899 1.1203 1.1516 1.1825	0.6163 1.0498 1.0604 1.0899
SPCTM : 0.00061 0.05772 0.2580 0.5017	0.05772 0.2580 0.5017 0.8226	0.2580 0.5017 0.8226 0.9049	0.5017 0.8226 0.9049 0.9257	0.00061 0.05772 0.2580 0.5017
SPUMS : 0.5257 0.5903 0.6249 0.6696	0.5903 0.6249 0.6696 0.7142	0.6249 0.6696 0.7142 0.7499	0.6696 0.7142 0.7499 0.7856	0.5257 0.5903 0.6249 0.6696
SPCTM : 0.0123 0.1159 0.4824 1.0997	0.1159 0.4824 1.0997 2.1337	0.4824 1.0997 2.1337 2.8719	1.0997 2.1337 2.8719 3.4857	0.0123 0.1159 0.4824 1.0997
SPUMS : 0.9106 0.9285 0.9463 0.9731	0.9285 0.9463 0.9731 0.9990	0.9463 0.9731 0.9990 1.0267	0.9731 0.9990 1.0267 1.0713	0.9106 0.9285 0.9463 0.9731
SPCTM : 1.3391 1.4284 1.5177 1.6070	1.4284 1.5177 1.6070 1.6963	1.5177 1.6070 1.6963 1.7855	1.6070 1.6963 1.7855 1.8748	1.3391 1.4284 1.5177 1.6070
SPUMS : 1.5214 1.6555 0.8965 0.6049	1.6555 0.8965 0.6049 0.5426	1.6555 0.8965 0.6049 0.2677	0.8965 0.6049 0.2677 0.1675	1.5214 1.6555 0.8965 0.6049
SPCTM : 2.4105 2.4997 2.5890 2.6783	2.4997 2.5890 2.6783 2.6783	2.5890 2.6783 2.6783 2.6783	2.6783 2.6783 2.6783 2.6783	2.4105 2.4997 2.5890 2.6783
SPECTRUM # 3				
SPUMS : 0.5257 0.5903 0.6249 0.6696	0.5903 0.6249 0.6696 0.7142	0.6249 0.6696 0.7142 0.7499	0.6696 0.7142 0.7499 0.7856	0.5257 0.5903 0.6249 0.6696
SPCTM : 0.0123 0.1159 0.4824 1.0997	0.1159 0.4824 1.0997 2.1337	0.4824 1.0997 2.1337 2.8719	1.0997 2.1337 2.8719 3.4857	0.0123 0.1159 0.4824 1.0997
SPUMS : 0.9106 0.9285 0.9463 0.9731	0.9285 0.9463 0.9731 0.9990	0.9463 0.9731 0.9990 1.0267	0.9731 0.9990 1.0267 1.0713	0.9106 0.9285 0.9463 0.9731
SPCTM : 1.3391 1.4284 1.5177 1.6070	1.4284 1.5177 1.6070 1.6963	1.5177 1.6070 1.6963 1.7855	1.6070 1.6963 1.7855 1.8748	1.3391 1.4284 1.5177 1.6070
SPUMS : 1.5214 1.6555 0.8965 0.6049	1.6555 0.8965 0.6049 0.5426	1.6555 0.8965 0.6049 0.2677	0.8965 0.6049 0.2677 0.1675	1.5214 1.6555 0.8965 0.6049
SPCTM : 2.4105 2.4997 2.5890 2.6783	2.4997 2.5890 2.6783 2.6783	2.5890 2.6783 2.6783 2.6783	2.6783 2.6783 2.6783 2.6783	2.4105 2.4997 2.5890 2.6783

SPEC TRIM # 2

SPOMS	:	0.4274	0.4432	0.4489	0.4525	0.4701	0.4987	0.4272	0.4272	0.4685	0.4600	0.4642	0.6944	0.7127
		0.7249	0.7417	0.7554	0.7769	0.7987	0.8196	0.5552	0.5552	0.5908	0.5965	0.6211	0.5678	1.0334
		1.0699	1.1403	1.2116	1.2924	1.3541	1.4254	1.4966	1.4966	1.5470	1.5470	1.7104	1.7104	1.8530
		1.3242	1.4655	2.0666	2.1290	2.1290	2.1290							
SPCTM	:	0.0380	0.2576	1.4482	3.4093	4.5916	8.8590	10.7524	11.8114	12.5372	12.8412	13.0157	13.0704	
		13.0205	12.8709	12.6556	12.2304	11.4967	11.0969	10.0334	8.9567	7.0317	4.0811	6.1264	5.3643	
		4.6742	3.5052	2.7666	2.1432	1.6730	1.3185	1.0475	0.8302	0.6770	0.5517	0.4524	0.3736	
		9.3105	6.2507	6.2185	6.1940									

SPEC TRIM # 5

SPOMS	:	0.2327	0.3649	0.3876	0.4153	0.4429	0.4451	0.4872	0.5038	0.5215	0.5315	0.5426	0.5537	
		0.5647	0.5759	0.5869	0.6035	0.6201	0.6367	0.6644	0.6921	0.7139	0.7415	0.7751	0.8026	
		0.8205	0.8559	0.9412	0.9666	1.0520	1.1073	1.1627	1.2181	1.2794	1.3218	1.3842	1.4395	
		1.4940	1.5503	1.6056	1.6610									
SPCTM	:	0.1342	1.2637	5.2587	13.0718	23.2573	31.3039	37.9944	41.7372	44.3012	45.2792	45.9921	46.1653	
		46.0092	45.5155	44.7548	43.2173	41.3213	39.2180	35.4540	31.6565	28.0773	24.6713	21.4460	18.9550	
		16.5837	12.7039	9.7753	7.5735	5.9149	4.6590	3.7014	2.9654	2.3052	1.9414	1.5967	1.3202	
		1.0973	0.9179	0.7722	0.6532									

CHANGES (IF ANY) IN STATION FORM PARAMETERS FOLLOW

U08(NW) :	16.8900	33.7800	42.2300	40.0000	90.0000	125.0000	160.0000
BETA(M) :	0.0	30.0000	45.0000	60.0000	90.0000	125.0000	160.0000
OMEGA(L) :	4.0000	3.0000	2.5000	2.2500	2.2000	2.1000	2.0000
	1.8000	1.7000	1.6000	1.5500	1.5000	1.4000	1.3000
	1.1000	1.0000	0.9000	0.8000	0.7000	0.6000	0.5000
	0.3000	0.2000	0.1000				
H13(NW) :	3.0200	4.9000	6.5000	10.2000	16.0000		
OMP(NW) :	0.0	0.0	0.0	0.0	0.0		

SPECTRUM # 4

SPOMS	:	0.4276	0.4432	0.4980	0.5345	0.5701	0.5987	0.6272	0.6495	0.6600	0.6842	0.7127
		0.7269	0.7412	0.7554	0.7768	0.7982	0.8196	0.8552	0.8908	0.9265	0.9671	1.0314
		1.0690	1.1403	1.2116	1.2828	1.3541	1.4254	1.4966	1.5670	1.6307	1.7104	1.7510
		1.9242	1.9955	2.0668	2.1380							
SPCTM	:	0.0380	0.3576	1.4882	3.6993	6.5818	8.8590	10.7524	11.8116	12.5377	12.8422	13.0147
		13.0205	12.8808	12.6656	12.2204	11.6967	11.0989	10.0334	9.9587	7.0217	6.0831	5.1264
		4.6932	3.952	2.7664	2.1433	1.6739	1.3185	1.0675	0.8202	0.6770	0.5517	0.4574
		0.3105	0.2597	0.2185	0.1860							

SPECTRUM # 5

SPOMS	:	0.3322	0.3599	0.3876	0.4153	0.4424	0.4651	0.4872	0.5024	0.5205	0.5315	0.5427
		0.5647	0.5758	0.5869	0.6025	0.6201	0.6267	0.6644	0.6921	0.7108	0.7475	0.7741
		0.8305	0.8859	0.9412	0.9666	1.0520	1.1073	1.1627	1.2181	1.2724	1.2759	1.2847
		1.4949	1.5503	1.6056	1.6610							
SPCTM	:	0.1342	1.2637	5.2587	13.0718	23.2573	31.3039	37.9944	41.7372	44.3017	45.3792	46.1853
		46.0092	45.5155	44.7548	43.2173	41.3313	39.2189	35.4560	31.6565	28.0773	26.6752	21.6640
		16.5837	12.7039	9.7753	7.5725	5.9149	4.6590	3.7014	2.9654	2.3057	1.5987	1.3201
		1.0973	0.9178	0.7722	0.6532							

CHANGES (IF ANY) IN STATION FORM PARAMETERS FOLLOW

CVA 68

NS	STA	NRDMS	NFNC	NVL	NMDT	NSP	NP	MP	NTURA	HASHK	NH	NREND	NWT	NPCH	NFG	NFR
21	27	7	3	0	0	15	9	0	1	0	0	0	0	0	1	0
NS	SEA	NSDMS	NS	NSPC	10	NAADR	NEV1									
2	5	0	0	1	0	0										
CB	CB	XLBP	BFAM	DRAFT		GRAV										
0.6210	1040.0000	134.0000	36.8330	32.1740		-13.3000										
RYY	RYY	RXX	RZZ	Y21		RHO										
260.0000	61.6400	260.0000	0.0	1.08999998	1.98999998	0.0000128	155700.00									
UNIT	UNIT	ORIGIN	ZETAA	ALFA												
0	0	0.0	0.0	0.0393												
STATION	I	X(I,1)	Y(I,1)	ZM(I,1)	SIGNAL(I)	ZCB(I,1)	GIRTH(I,1)	RIFLR(I,1)	ALPH(I,1)							
1	520.0000	1.0000	36.8330	5.0498	-20.0000	82.0000	0.0	0.0	0.0	0.0						
2	468.0000	18.0000	36.8330	0.9P64	-20.0000	87.0000	0.0	0.0	0.0	0.0						
3	416.0000	38.2000	36.8330	0.8216	-18.0000	94.8000	0.0	0.0	0.0	0.0						
4	364.0000	59.6000	36.8330	0.8000	-16.0000	109.2000	0.0	0.0	0.0	0.0						
5	312.0000	80.0000	36.8330	0.8111	-16.0000	126.0000	0.0	0.0	0.0	0.0						
6	260.0000	98.0000	36.8330	0.8616	-16.0000	144.0000	0.0	0.0	0.0	0.0						
7	208.0000	113.0000	36.8330	0.8967	-16.0000	142.0000	0.0	0.0	0.0	0.0						
8	156.0000	123.0000	36.8330	0.9337	-16.0000	176.8000	0.0	0.0	0.0	0.0						
9	104.0000	129.4000	36.8330	0.9601	-16.0000	188.0000	0.0	0.0	0.0	0.0						
10	52.0000	133.0000	36.8330	0.9774	-16.0000	192.0000	0.0	0.0	0.0	0.0						
11	0.0	136.0000	36.8330	0.9899	-16.0000	202.0000	0.0	0.0	0.0	0.0						
12	-52.0000	134.0000	36.8330	0.9924	-16.0000	202.0000	0.0	0.0	0.0	0.0						
13	-104.0000	136.0000	36.8330	0.9791	-16.0000	197.0000	0.0	0.0	0.0	0.0						
14	-156.0000	133.8000	36.8330	0.9501	-16.0000	184.0000	0.0	0.0	0.0	0.0						
15	-208.0000	132.8000	36.8330	0.9934	-16.0000	178.5000	0.0	0.0	0.0	0.0						
16	-260.0000	130.0000	36.8330	0.7986	-15.0000	167.0000	0.0	0.0	0.0	0.0						
17	-312.0000	124.8000	34.0000	0.7235	-14.0000	157.0000	0.0	0.0	0.0	0.0						
18	-364.0000	116.0000	29.0000	0.6403	-14.0000	149.5000	0.0	0.0	0.0	0.0						
19	-416.0000	102.0000	21.5000	0.5891	-12.0000	112.0000	0.0	0.0	0.0	0.0						
20	-468.0000	82.0000	14.0000	0.5565	-6.0000	87.0000	0.0	0.0	0.0	0.0						
21	-520.0000	55.2000	6.8000	0.5595	-3.0000	55.2000	0.0	0.0	0.0	0.0						
STATION	I	IWK(I,1)	BKRAD(I,1)	BILRAD(I,1)	BKGIR(I,1)	BKWD(I,1)	PHI(I,1)	PSI(I,1)	LIWNI(I)							
1	2	44.0000	10.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
2	2	44.0000	15.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
3	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
4	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
5	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
6	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
7	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
8	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
9	7	72.2000	12.0000	31.2000	4.0000	1.44363	0.2094	0.2094	0.2094	0.2094						
10	7	75.4000	11.0000	32.5000	4.0000	0.4485	0.2094	0.2094	0.2094	0.2094						
11	7	77.2000	10.2500	34.0000	4.0000	0.4573	0.2094	0.2094	0.2094	0.2094						
12	7	77.2000	10.2500	34.0000	4.0000	0.4712	0.2269	0.2269	0.2269	0.2269						
13	7	75.2000	11.0000	32.5000	4.0000	0.4538	0.2269	0.2269	0.2269	0.2269						
14	7	72.2000	12.0000	31.2000	4.0000	1.44363	0.2443	0.2443	0.2443	0.2443						
15	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
16	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
17	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
18	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
19	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
20	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
21	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						

UCBIN)	:	16.4990	23.7891	4.2-2.200		
BETAIN)	:	0.0	20.0000	45.0000	60.0000	90.0000
OMEGA(L)	:	4.0000	3.0000	2.5000	2.2500	2.2000
		1.8000	1.7000	1.5000	1.5500	1.5000
		1.1000	1.0000	0.9000	0.8000	0.7000
		0.2000	0.2000	0.1000	0.0800	0.0600
M13(NW)	:	3.0200	4.9000	6.5000	10.2000	16.0000
OMP(NW)	:	0.0	0.0	0.0	0.0	0.0

UCB(N)	:	16.6900	23.7600	42.2500			
BETA(H)	:	0.0	30.0000	45.0000	60.0000	90.0000	135.0000
OMEGA(L)	:	4.0000	3.0000	2.5000	2.2500	2.2000	2.0000
		1.8000	1.7000	1.6500	1.5500	1.5000	1.4000
		1.1000	1.0000	0.9000	0.8000	0.7000	0.6000
		0.2000		0.1000			
H13(NH)	:	3.0200	4.9000	6.5000	10.7000	16.0000	
OMP(NH)	:	0.0	0.0	0.0	0.0	0.0	0.0

SPECTRUM # 4

SPOMS	:	0.4276	0.4633	0.4989	0.5245	0.5702	0.5987	0.6272	0.6495	0.6700	0.6927	0.6946
		0.7270	0.7412	0.7555	0.7769	0.7982	0.8196	0.8553	0.8800	0.9025	0.9272	0.9434
		1.0691	1.1404	1.2116	1.2820	1.3542	1.4254	1.4967	1.5450	1.6207	1.7105	1.7918
		1.9244	1.9956	2.0669	2.1387							
SPCTM	:	0.0380	0.3576	1.4681	3.6091	6.5814	8.8564	10.7517	11.8100	12.5344	13.8414	15.0666
		13.0197	12.6800	12.6648	12.2297	11.6960	11.0962	10.0323	8.9582	7.0217	6.0575	5.1740
		4.6929	3.5950	2.7662	2.1432	1.6738	1.3184	1.0474	0.9302	0.6779	0.5117	0.4524
		0.3105	0.2597	0.2185	0.1940							

SPECTRUM # 5

SPOMS	:	0.3322	0.3599	0.3676	0.4153	0.4430	0.4651	0.4873	0.5039	0.5205	0.5416	0.5527
		0.5648	0.5759	0.5869	0.6035	0.6201	0.6368	0.6644	0.6921	0.7105	0.7475	0.7752
		0.8306	0.8859	0.9413	0.9647	1.0520	1.1074	1.1628	1.2182	1.2735	1.3790	1.4343
		1.4950	1.5504	1.6057	1.6611							
SPCTM	:	0.1342	1.2636	5.2584	13.0710	23.2559	31.3070	37.9920	41.7346	44.2984	45.3763	46.9807
		46.0063	45.5126	44.7520	43.2147	41.3287	39.2165	35.4518	31.6545	29.0754	24.6726	21.6467
		16.5827	12.7031	9.7747	7.5730	5.9145	4.6587	3.7011	2.9657	2.3050	1.9205	1.5946
		1.0973	0.9177	0.7721	0.6537							

CHANGES (IF ANY) IN STATION FORM PARAMETERS FOLLOW